

Amendments to the Specification:

Please replace paragraph [0001] with the following rewritten paragraph:

[0001] The present invention relates to a piercing device that is used for piercing a number of pinholes in a rubber sheet for sufficiently extracting air or the like liable to be captured the rubber sheet as a tire constitutive members in the form of embedding reinforcement cords therein, such as carcass ply materials, belt ply materials, etc., or captured between laminated layers upon building of green tires. In particular, the present invention provides a technology capable of effectively preventing the piercing needles from being acted ~~by~~by an unreasonable force, undesired enlargement of the pinholes and deformation of the rubber sheet, etc.

Please replace paragraph [0004] with the following rewritten paragraph:

[0004] With this known device, however, it is necessary for the piercing needles 93, which are pierced into the rubber sheet S wound about the outer tube 91, to be moved relatively to the rubber sheet S in its traveling direction, thereby giving rise to a problem of undesired expansion of the pinholes formed in the rubber sheet, deformation of the rubber sheet, etc. The reason for causing such relative movement will be explained below. Assuming that the outer peripheral surface of the outer tube 91 has a radius r , and the rubber sheet S wound on the outer tube 91 is moved in the direction ~~of~~of the arrow in FIG. 7 with a constant linear speed v , the surface speed of the outer tube 91 is also v so that the rotational speed of the outer tube 91 is v/r .

Please replace paragraph [0006] with the following rewritten paragraph:

[0006] If the inner tube 92 is provided with a single piercing needle 93 only, it is possible to prevent relative movement between the piercing needle 93 and the rubber sheet S

by controlling the rotating speed of the inner tube 92 depending upon its rotating position. However, in the conventional device 90, all the piercing needles arranged at a predetermined distance in the circumferential direction are integrally provided ~~for the~~on the inner tube 92, the rotating speeds of the piercing needles at different rotating positions must be the same with each other. Thus, the inner tube must be rotated one turn as the outer tube is rotated by one turn, with a substantially constant rotating speed. Therefore, particularly at a position adjacent to the above-mentioned intermediate position B, the relative movement between the piercing needle 93 and the rubber sheet S becomes marked, thereby making it impossible to prevent undesired enlargement of the pinholes formed by the piercing needles.

Please replace paragraph [0008] with the following rewritten paragraph:

[0008] (1) A first aspect of the present invention resides in a piercing device wherein an outer tube is rotatably supported on ~~one of shafts, which are~~a first shaft which is eccentrically arranged relative to ~~each other,~~a second shaft, so that it can be driven for rotation, wherein a plurality of piercing needles are arranged on the ~~other of the shafts~~second shaft in said outer tube, ~~said the~~ plurality of piercing needles being spaced from each other in a circumferential direction, and projecting radially outwards, and being independently rotatable, ~~each said the~~ piercing ~~needle~~needles being adapted to be extended and retracted relative to an outer surface of the outer tube, via a through hole formed in the outer tube, wherein a needle restraining member is rotatably supported on ~~said the other~~second shaft, for transmitting torque to the piercing needles when driven for rotation, wherein ~~said the~~ piercing needles are rotatably supported on ~~said the other~~second shaft via needle support members, respectively, and wherein ~~said the~~ piercing needles ~~and further piercing needles,~~ which are rotatable integrally with ~~said piercing needles,~~each other, are fixedly connected to ~~said the~~ needle support members in an axial juxtaposition with each other.

Please replace paragraph [0009] with the following rewritten paragraph:

[0009] (2) A second aspect of the present invention resides in the piercing device according to the first aspect, wherein ~~said~~the outer tube and ~~said~~the needle support members are connected to a driving means for driving them at a constant speed.

Please replace paragraph [0010] with the following rewritten paragraph:

[0010] (3) A third aspect of the present invention resides in the piercing device according to the first or second aspect, wherein a rotating radius of ~~said~~the outer surface of the outer tube and a rotating radius of a tip end of each ~~said~~of the piercing ~~needle~~needles are the same with respect to each other, and an amount of eccentricity of said shafts is within a range of 10-15 mm.

Please replace paragraph [0011] with the following rewritten paragraph:

[0011] With the features (1) according to the first aspect of the present invention, the plurality of piercing needles projecting radially outwards at a distance in the circumferential direction are arranged so that they can be independently rotated relative to each other, and each piercing needle can be moved outwards and inwards relative to the surface of the outer tube via a through hole formed in the outer tube. Therefore, after the piercing needle has been advanced into the rubber sheet, the piercing needle is driven by the rubber sheet so as to undergo a free rotation without being acted by any additional restraining force, so as to effectively prevent the piercing needles from being acted by unreasonable force, undesired enlargement of the pinholes and deformation of the rubber sheet. Moreover, each of the piercing needles are rotatably supported on ~~said the other~~the second shaft via needle support members, respectively, and the piercing needles and further piercing needles which are

rotatable integrally with the said piercing needles are fixedly connected to the needle support members in an axial juxtaposition with each other. ~~thus,~~Thus, when three or more piercing needles are arranged in juxtaposition relative to each other, these piercing needles can be collectively secured to the needle support member and the needle support member can be rotatably supported at two locations in the axial direction so as to reduce the length required for axially arranging the bearings as compared to the case wherein each piercing needle is individually supported by one bearing, thereby making it possible to arrange an increased number of piercing needles in the axial direction.

Please replace the heading on page 5, line 13, with the following rewritten heading.

~~BEST MODE FOR CARRYING OUT THE INVENTION~~DETAILED
DESCRIPTION OF EMBODIMENTS

Please replace paragraph [0015] with the following rewritten paragraph:

[0015] The basic concept of the present invention will be explained below with reference to the drawings, wherein FIG. 1 is a sectional view of the piercing device 1, showing the basic concept of the present invention, FIG. 2 is a sectional view of the piercing device taken along the line II-II in FIG. 1, and FIG. 3 is a sectional view of the piercing device taken along the line III-III in FIG. 1. The piercing device 1 comprises an outer tube 2 which is integrally connected to a rotatable shaft 7 supported by bearings 11A, 11B and adapted to be driven by a motor M, and a plurality of piercing needles 3 which are rotatably provided for a stationary shaft 8 and arranged to project radially outwards at an interval in the circumferential direction. Here, the rotatable shaft 7 constitutes ~~one~~the first shaft having an axis X1, and the stationary shaft 8 constitutes the ~~other~~second shaft having an axis X2, wherein the axes X1, X2 are eccentrically arranged by an eccentricity δ .

Please replace paragraph [0017] with the following rewritten paragraph:

[0017] In the illustrated embodiment, the piercing needles 3 are arranged in two rows in the axial direction, with each row including six needles which are arranged in the circumferential direction. Thus, there are twelve needles in total. The piercing needles 3 in each row are connected to the respective bearings 4 (4a-4f) with a one-to-one relationship, wherein these bearings are independently rotatable. Thus, with reference to the row illustrated on the right side in FIG. 1, the piercing needle 3a is connected to the bearing 4a, the piercing needle 3b is connected to the bearing 4b, and the piercing needles 3c-3f are similarly connected to the respective bearings 4c-4f. The bearings 4a-4f are rotatable about the axis X2 independently of ~~the~~each other, so that the piercing needles 3a-3f are also rotatable about the axis X2 independently of ~~the~~each other.

Please replace paragraph [0029] with the following rewritten paragraph:

[0029] In the above, the basic concept of the present invention has been described above with reference to an embodiment wherein the piercing needles 3 are provided in two rows. If, however, the piercing needles 3 of an increased number are to be arranged more closely, it would be necessary to increase the number of the bearings, ~~though~~although the number of ~~the~~ bearings that can be arranged on the shaft in alignment with each other is limited by itself. Therefore, the present invention further provides an advanced embodiment of the piercing device that can be used in such a case also, which will be described below with reference to FIGS. 4 to 6.

Please replace the Abstract with the attached replacement Abstract.